

Abstract of the Disclosure

A two-phase thermodynamic power system includes a capillary device, vapor accumulator, superheater, an inline turbine, a condenser, a liquid pump and a liquid preheater for generating output power as a generator. The capillary device, such as a loop heat pipe or a capillary pumped loop, is coupled to a vapor accumulator, superheater, the inline turbine for generating output power for power generation, liquid pump and liquid preheater. The capillary device receives input heat that is used to change phase of liquid received from the liquid preheater, liquid pump and condenser into vapor for extra heating in the superheater used to then drive the turbine. The power system is well suited for space applications using a radioisotope, active nuclear or solar heat source. The system can use waste heat from various dynamic or static power systems as a heat source and waste heat from spacecraft components such as electronics as a heat source. These heat sources can be used separately or in any combination. The power system can be combined with thermal energy storage devices when operated with heat sources that are not steady state. Heat sources are useful for driving the capillary wick, superheater and liquid preheater for increased power efficiency and long lifetime operation. The power system is well suited for space receiving heat from a heat source to produce useful mechanical energy. A superheater in combination with a liquid pump and preheater are implemented for use with the evaporator for improved thermal efficiency while operating at maximum cycle temperatures well below other available power conversion cycles.